



UNIVERSITY
OF TASMANIA

School of Chemistry

Faculty of Science, Engineering and Technology

KRA211 Environmental Chemistry

2008

Unit Outline

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Unit summary

Unit code	KRA211
Unit title	Environmental Chemistry
Unit description	KRA211 is a Semester 1 unit (12.5%) that covers aspects of environmental chemistry. This unit will develop an understanding of the chemical behaviour of important elements and compounds in the environment, with an emphasis on aquatic, marine and atmospheric chemistry. Topics include general, inorganic and organic chemistry; pollutants in the aquatic environment and wastewater treatment; introductory soil chemistry; the Greenhouse Effect and urban air pollution.
Teaching staff	Dr Trevor Lewis (Water Pollution and Soil Chemistry, Unit Coordinator) Dr Andrew Seen (Air Pollution) Prof Allan Canty (Inorganic Environmental Chemistry)
Campus & mode	Hobart and Launceston Campus by face to face and video conferencing
Unit weight	12.5%
Teaching pattern	1 st Semester, 39 lectures, 12 tutorials and 2 field trips
Prerequisites	KRA110, KRA130 or KJC103 or KRA101 and KRA102
Assessment	The assessment for this course will be based on examinations (75%) and assignments and reports on excursions (25%)
Textbook	Manahan, S., <i>Environmental Chemistry 8th Ed</i> , CRC Press.

Further learning resources

Non-text resources

All lectures will be recorded and will be available on the KRA211 MyLO homepage under their resources.

Other publications

Printed lecture notes will be available from the University Printery on each campus.

Learning outcomes

Learning objectives for Inorganic Environmental Chemistry

On completion of this unit, you should have:

1. An understanding of the importance of the chemistry of metals in the environment.
2. An understanding of the interaction of metals with naturally and unnaturally occurring materials in the environment.
3. An understanding of the differences between the chemistry of the elements in the marine, atmospheric and terrestrial environments.

Learning Objectives for Atmospheric Chemistry

The following learning objectives give an overview of the expected understanding at the end of this lecture course:

1. Understand the means by which contaminants are introduced to, dispersed through, and removed from, the atmosphere.
2. Know the main sources of important inorganic and organic atmospheric contaminants, such as nitrogen and sulphur species, carbon monoxide, carbon dioxide, CFCs, hydrocarbons, and particulate matter.
3. Know the difference between primary and secondary pollutants, and the atmospheric chemical processes responsible for the formation of secondary pollutants.
4. Be able to briefly discuss the composition of atmospheric aerosols and particulate pollution.
5. Understand the terms TSP, PM₁₀, and Air NEPM, the means by which particulate pollution is measured, and the technology used to reduce particulate pollution.
6. Understand the processes by which nitrogen and sulfur oxides are converted to acid rain.
7. Be able to explain the daily cycle of photochemical smog with chemical equations.
8. Be able to discuss the contributions/potential contributions of the main greenhouse gases/species, namely water vapour, carbon dioxide, methane, ozone, nitrous oxide, CFCs and aerosols, to global warming.
9. Know the sources and sinks of carbon dioxide.
10. Understand how the release of CFCs in the troposphere eventually results in the catalytic depletion of ozone in the stratosphere.
11. Be able to describe, with chemical equations, the atmospheric production of HNO₃.
12. Be able to describe, with chemical equations, the atmospheric production of H₂SO₄.
13. Be able to describe the strategies for reducing SO₂ emissions from coal combustion and sulphide ore smelting.
14. Understand the terms TSP and PM₁₀ and know the units by which they are quantified.
15. Know why PM₁₀ are a health hazard and know what the PM₁₀ Air NEPM is.
16. Be able to list sources of atmospheric aerosols, and briefly discuss the composition of the aerosols emitted from each source.

17. Be able to draw a diagram to show the relative proportions of the solar flux reaching the Earth that are absorbed or reflected by components of the Earth's environment.

Learning Objectives for Water Treatment and Related Processes and Soil Chemistry

On completion of this unit you should have an understanding of the sources, reactions, affects and treatment of a range of inorganic and organic "pollutants" in waters and of the organic and inorganic chemistries of soil. To do this you should:

1. Be able to determine the solubility of gases in water and how their concentration is measured.
2. Know how oxygen is depleted in water and how this effect is measured.
3. Know what surfactants are, how their levels are measured and they degrade the environment.
4. Know what acidity, alkalinity and hardness are, what contributes to them, how they are determined and their role in the environment.
5. Know what pesticides are, the need for pesticides, the classes of pesticides, their chemistries, their toxicity and their breakdown, and practical alternatives.
6. Know what PCBs, PBBs are, their chemistries, their sources, their toxicity and their breakdown.
7. Know how drinking water is "purified", and how sewage and industrial waters are treated before release into the environment or re-use (including drinking).
8. Know how soil is formed from rocks and other inputs.
9. Know the major inorganic and organic components of soil, how they are classified and interrelated.
10. Understand the role these inorganic and organic components in detoxifying and stabilising pollutants.

Details of teaching arrangements

Lectures

Three lectures per week will be given over Weeks 1 to 13, either face to face or by video link depending which campus you are on (see below).

Tutorials

Tutorials will be held in weeks 2-13 on Monday at 1.10pm on the Sandy Bay Campus and Wednesday 3.10 pm on the Newnham Campus. Although it is not compulsory to attend the tutorials, it is strongly recommended that you attend to obtain feedback on your assignments and other aspects of the course.

Excursions

There will be excursions to two sites, one to an environmental laboratory and one to a sewage treatment plant or an industrial waste-water treatment plant. The latter excursion will require the student to submit a written report.

Online/videoconference activities

The Monday and Tuesday lectures will be face to face for students in Hobart, and repeated face to face for Launceston students on Wednesday (times by mutual agreement). The Wednesday 2.10 pm lecture will **generally** be face to face for students in Launceston and videoconferencing for those in Hobart.

Occupational health and safety (OH&S)

The University is committed to providing a safe and secure teaching and learning environment. As the CSIRO and Plant visits are to working laboratories or industrial sites, enclosed shoes must be worn on these occasions. In addition to specific requirements of this unit you should refer to the University's policy at: http://www.admin.utas.edu.au/hr/ohs/pol_proc/ohs.pdf

Unit schedule

KRA211 students will attend lectures in accordance with the following schedule:

Week	Week Beginning	LECTURES			TUTORIAL
		Monday 12:00 -12:50	Tuesday 14:10-15:00	Wednesday 14:10-15:00	Monday 1.10 - 2.00
Venue:		SB.Chem328	SB.Chem328	SB.MMLib.B102. Video NH.X117.Video	SB.Chem328
1	25 Feb	TWL	TWL	AJC	Free
2	3 March	TWL	TWL	AJC	Free
3	10 March	Labour Day	TWL	AJC	Labour Day
4	17 March	TWL	TWL	AJC	AJC
Easter Break 20 - 26 March Inclusive					
5	31 March	TWL	TWL	AJC	TWL
6	7 April	CSIRO Visit (Hob)	TWL	AJS	CSIRO Visit (Hob)
7	14 April	AJC	AJC	AJS	AJC
8	21 April	TWL	AJC	AJS	TWL
9	28 April	Plant Visit (Hob)	TWL	AJS	Plant Visit (Hob)
10	5 May	TWL	TWL	AJS	TWL
11	12 May	TWL	TWL	AJS	TWL
12	19 May	AJS	TWL	AJS	AJS
13	26 May	TWL	TWL	AJS	TWL

AJC: Prof Allan Canty

AJS: Dr Andrew Seen

TWL: Dr Trevor Lewis

Assignment Schedule

Number	Lecturer	WEEK OUT Monday 12:50	WEEK IN Monday 12.50
1	AJC	5	7
2	TWL	8	10
3	AJS	11	13

Learning expectations and strategies

Expectations

The University is committed to high standards of professional conduct in all activities, and holds its commitment and responsibilities to its students as being of paramount importance. Likewise, it holds expectations about the responsibilities students have as they pursue their studies within the special environment the University offers.

The University's Code of Conduct for Teaching and Learning states:

Students are expected to participate actively and positively in the teaching/learning environment. They must attend classes when and as required, strive to maintain steady progress within the subject or unit framework, comply with workload expectations, and submit required work on time.

Learning strategies

If you need assistance in preparing for study please refer to your tutor or lecturer. For additional information refer to the Learning Development website : <http://www.utas.edu.au/learndev/>

If you will be using WebCT for the first time and would like some information on how to use WebCT refer to the following guide: http://www.utas.edu.au/coursesonline/docs/using_webct.pdf

Some of the units you will study use videoconferencing to deliver lectures and tutorials. To enable you to get the best out of a videoconference please refer to the following guide.
<http://www.its.utas.edu.au/videoconf/vcstudentguide.pdf>

Specific attendance/performance requirements

As there is no laboratory component to this unit, students are expected to attend both excursions. Although it is not compulsory to attend the tutorials, it is strongly recommended that you attend to obtain feedback on your assignments and other aspects of the course.

Assessment details

The assessment for this course will be based on examinations, assignments and reports on excursions.

Assignments and Reports	25%
Examination (1 x 3 hour)	75%

The final exam is conducted by the University Registrar in the formal examination period. See the *Current Students* homepage on the University's website.

- All Sections and Questions in the examination are to be attempted
- Some Sections/Questions may have options
 - Section A: Prof Allan Canty (AJC) Inorganic Environmental Chemistry
 - Section B: Dr Trevor Lewis (TWL): Water Treatment & Related Processes
 - Section C: Dr Andrew Seen (AJS): Atmospheric Chemistry

To gain a pass or better in this unit, a student must pass the Assignments and Reports component **and** the Examination component of the assessment.

How your final result is determined

The final mark for the unit consists of two components: Examinations and Assignments/Excursion Report.

Their contribution to the final mark is given below:

Examinations	75%
Assignments/Excursion Report	25%

Grades will be awarded as follows:

Pass 50 – 59% overall, Credit 60 – 69% overall, Distinction 70 – 79 % overall, High distinction 80 – 100% overall.

It is mandatory that you achieve a passing grade for the overall examination component and for the overall assignment and report component.

Requests for extensions

Any case for an extension of deadline for the submission of assignments/reports based on extenuating circumstances (such as a medical condition) must be made by the student **before** the due submission date.

Penalties

A penalty of 10% of the assessed mark will be imposed for each working day that an assignment or report is late. Work that is submitted more than 10 days late will not be marked.

Academic referencing

In your written work you will need to support your ideas by referring to scholarly literature, works of art and/or inventions. It is important that you understand how to correctly refer to the work of others and maintain academic integrity.

Failure to appropriately acknowledge the ideas of others constitutes academic dishonesty (plagiarism), a matter considered by the University of Tasmania as a serious offence.

For information on presentation of assignments, including referencing styles:

<http://www.utas.edu.au/library/assist/gpoa/gpoa.html>

Please read the following statement on plagiarism. Should you require clarification please see your unit coordinator or lecturer.

Plagiarism

"Plagiarism is a form of cheating. It is taking and using someone else's thoughts, writings or inventions and representing them as your own; for example, using an author's words without putting them in quotation marks and citing the source, using an author's ideas without proper acknowledgment and citation, copying another student's work.

If you have any doubts about how to refer to the work of others in your assignments, please consult your lecturer or tutor for relevant referencing guidelines, and the academic integrity resources on the web at

<http://www.utas.edu.au/tl/supporting/academicintegrity/index.html>.

The intentional copying of someone else's work as one's own is a serious offence punishable by penalties that may range from a fine or deduction/cancellation of marks and, in the most serious of cases, to exclusion from a unit, a course or the University. Details of penalties that can be imposed are available in the Ordinance of Student Discipline – Part 3 Academic Misconduct, see

<http://www.utas.edu.au/universitycouncil/legislation/> "

The University and any persons authorised by the University may submit your assessable works to a plagiarism checking service, to obtain a report on possible instances of plagiarism. Assessable works may also be included in a reference database. It is a condition of this arrangement that the original author's permission is required before a work within the database can be viewed.

For further information on this statement and general referencing guidelines, see <http://www.utas.edu.au/plagiarism/>

Further information and assistance

If you are experiencing difficulties with your studies or assignments, have personal or life planning issues, disability or illness which may affect your course of study, you are advised to raise these with your lecturer in the first instance.

There is a range of University-wide support services available to you including Student Services, International Services and Learning Development. Please refer to the *Current Students* homepage at: <http://www.utas.edu.au/students/>

Should you require assistance in accessing the Library visit their website for more information at <http://www.utas.edu.au/library/>



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